Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Issued January 19, 1907.

United States Department of Agriculture,

FOREST SERVICE—Circular 67.

GIFFORD PINCHOT, Forester.

FOREST PLANTING LEAFLET.

WHITE PINE (Pinus strobus).

FORM AND SIZE.

The white pine is the largest of all conifers indigenous to the eastern part of the United States. On proper soils it may reach the age of 250 years or more and attain a height of 150 to 175 feet and a diameter of 3 to 5 feet. The crowns of mature white pines in mixed forests conspicuously overtop the surrounding hardwoods. Mature forest-grown trees are characterized by straight, columnar trunks, destitute of branches for a distance of 75 to 100 feet from the ground, and thin, irregular crowns. At the base of the trunks of old trees the bark is thick and deeply furrowed and of a dark brown color, but becomes thinner and grayish toward the upper part of the tree.

RANGE.

The northern boundary of the natural range of white pine is from Newfoundland west to eastern Manitoba. Through the lake region the range extends west to eastern Minnesota and south to northern Iowa, Indiana, Illinois, and Ohio. In the East it originally occurred throughout New England and the Middle States, and, on the higher elevations of the Appalachians, southward to Georgia and Alabama. It was found in greatest abundance and reached its best development in the St. Lawrence Valley and the lake region. It usually grows in association with hardwoods and other conifers and reaches its largest size in mixture with the former.

White pine may be planted in suitable situations throughout its natural range, but for economic purposes planting should be restricted to nonagricultural lands in New England, Pennsylvania, New York, the Lake States, and the higher slopes of the Appalachians, and should be resorted to only when conditions render natural replacement impracticable, since in many situations, if the land is protected from fire, white pine will extend itself rapidly by natural seeding. Much of the abandoned agricultural land in New England may be profitably planted with this tree, which can be recommended for reforesting burned and cut-over areas generally throughout its economic planting range.

16771—No. 67—07 M

HABITS AND GROWTH.

White pine grows naturally and best in a cool climate on a fresh, light, deep, and sandy soil with a porous subsoil. It readily adapts itself to both dry and moist soils, for it is found on the poorest and dryest sand and on steep, rocky slopes, and also on moist clay flats and river bottoms, provided the latter are not continuously wet. It is capable of disputing possession with hardwoods, even on fresh, medium-heavy clay and loam soils. It will endure windy and cold exposures, but should not be planted near the seacoast, since it can not withstand strong sea breezes.

White pine can endure considerable shade for a number of years, but as it becomes older it requires more and more light for its development, and after it is 40 or 50 years old the crown demands full sunlight. On this account white pine is best grown in mixture with slower growing hardwoods or other conifers which will not overtop or shade it from above.

In artificial plantations or on abandoned farms which have been reforested naturally, white pine usually grows much faster than in the forest, especially during the early years. Records of plantations in New England show that the average growth of the larger trees ranges from one-fourth to one-third of an inch in diameter annually. It is possible in the eastern portion of the United States to produce saw timber in from sixty to seventy years. Smaller trees suitable for box boards and match blocks can be produced in thirty or forty years.

Owing to the thinness of its bark, young white pine is very susceptible to injury by fire, which must be most carefully excluded from plantations; but between the fifth and twentieth years the greatest cause of injury to the white pine is a weevil which in the grub stage mines in the terminal shoot and causes a crooked stem. Repeated attacks make the tree unmerchantable.

ECONOMIC USES.

The wood of the white pine is soft, light, straight grained, and easily worked, and will not warp. It was formerly used to a great extent for general construction, but on account of its growing scarcity and high price it has been largely superseded for this purpose by other woods. The better grades of this lumber are still used in naval construction—for decking, interior finishing, and spars.

Second-growth white pine is used principally for low-grade lumber, match blocks, box boards, wooden ware, and straight-staved cooperage. Where a demand for this material exists, white pine on nonagricultural lands will prove of economic value. Throughout the manufacturing regions of New England, wherever there is a market

for small material, white pine will prove the most profitable conifer that can be grown on poor soils.

Within its range of economic planting white pine forms a very satisfactory windbreak or shelterbelt.

METHODS OF PROPAGATION.

White pine reproduces only from seed. Plantations should be started from nursery-grown stock rather than from seed, which usually gives unsatisfactory results.

If only a few hundred plants are desired, it usually is cheaper and easier to buy them from a nurseryman than to raise them, but if several thousand plants are needed it will be cheaper to raise them from seed. Purchased stock should be secured in the early spring before planting time, and upon receipt should be unpacked immediately and the roots dipped into a bucket containing thin mud. The trees should then be heeled-in in a shady place to await planting time, care being taken that the foliage does not become covered.

If the trees are to be grown in a home nursery, the seed may be purchased, but a large saving may be made by collecting it in the neighborhood, if this can be done. Cones should be gathered during the latter part of August or in September, before they begin to open. They may be picked from standing trees, or from felled trees if lumbering operations are being conducted nearby. When gathered, the cones should be spread out on a sheet or floor, where they will be exposed to the sun, yet protected from wind and rain. Within a week they will open and allow the seed to drop out. A thorough stirring will separate the seed; after which the cones may be raked away. One bushel of cones will yield from one-half a pound to 1 pound of clean seed, which will average from 29,000 to 30,000 seeds per pound. Seeds may be stored over winter by placing in small sacks and hanging the sacks in a cold, dry place.

The most successful method of raising seedlings is by sowing the seed in nursery beds. Seed beds should be composed of fine, loose, fairly fertile soil, moderately moist but always well drained. The soil must not be too rich; otherwise the seedlings will suffer when transplanted to the less favorable conditions of the permanent site.

A convenient size for seed beds is 4 by 12 feet, with a path about 18 inches wide between the beds, so that the plants can be weeded and cared for with ease. The seed should be sown in drills, 4 to 6 inches apart, and lightly covered with fine earth. Sowing should not begin until the ground is warm enough to cause rapid germination. Seed may be safely sown at the time garden vegetables are planted. After a seed bed is sown the surface should be "firmed" with a board or light roller.

The plants will begin to appear in from three to five weeks. Like other conifers, they will require partial shade during the first season, but subsequently can endure full sunlight, especially in New England. A shade frame of lath supported 18 inches above the bed will serve the purpose.

One pound of white-pine seed is sufficient to sow 500 linear feet of seed drill, or about 200 square feet of seed beds, with drills 6 inches apart. Even with proper care some seed may fail to germinate promptly, but about 10,000 plants may be expected for every pound of fertile seed sown. White-pine seed retains its vitality for several years, and when kept in cold, dry storage a fair percentage has been known to germinate after five years. Fresh seed, however, is always to be preferred.

Two years after sowing, the seedlings should be transplanted in the spring from the seed beds to nursery rows, in order to develop a good, fibrous root system. They may be set out 3 inches apart, in rows from 12 to 18 inches apart. The roots should be set slightly deeper than they were before. The best method of transplanting is to open a shallow trench of the proper depth with a spade and set the plants by hand, carefully covering the roots of each plant with fine soil and gently firming it. Transplants, if thoroughly cultivated and weeded, will be ready for final planting at the beginning of the fourth season. At this age they should be 6 to 9 inches in height and have a well-developed system of fibrous roots.

In the early years of the white pine a very injurious fungus must be guarded against. If the soil becomes soaked, or sufficient light and air are withheld, ideal conditions for the action of the fungus exist, and the usual result is the "damping off" of large numbers of the young trees. In shaded seed beds, when the quantity of rain is sufficient to endanger the young trees, the "damping off" may be checked by so raising one side of the shade frame that it acts as a partial roof. Dry sand sprinkled over the seed bed will usually tend to hold the fungus in check.

Birds and field mice are often very troublesome around coniferous seed beds. If danger from such sources is expected, the seed may be coated with red lead mixed with linseed oil before sowing. This is distasteful to most birds and rodents and is usually quite effective. Another method is to protect the beds by netting and similar devices until the seedlings are sufficiently developed to be free from danger.

PLANTING.

White-pine seedlings should be planted on the permanent site in the early spring when the ground is dry enough to work. In most cases the site will not need preparation previous to planting.

The roots must not be allowed to become dry during the planting. Even brief exposure of the roots to the sun and air will cause the plants to die.

The distance apart at which the trees should be planted depends upon the character of the site and whether the pines are to be planted in mixture with other trees or in a pure stand. The usual distance is 6 by 6 feet apart.

In pure plantations white pine produces excellent forest conditions, but it is also adapted to growth with a number of other species of which chestnut, European larch, Norway spruce, red oak, and hard maple are the more important. Chestnut is a very desirable tree for mixture with white pine on well-drained soils which are not calcareous, but since the planting range of chestnut does not, except in Vermont and New Hampshire, extend above the forty-second degree of latitude, it can not be used in mixture except within a limited area. In Pennsylvania, Michigan, Wisconsin, Minnesota, and northern New York white pine may be mixed with European larch, Norway spruce, or hard maple, and on soils adapted to red oak the latter may be used to advantage. In mixture with chestnut or European larch white pine should constitute at least two-thirds of the stand, spaced according to the following diagram:

[6 feet by 6 feet.]

P P S P P

P S P P S

S P P S P

P P S P P

P=white pine. S=chestnut or European larch.

Mixed with other species, the stand should be composed of an equal number of white pine and the associated species planted alternately.

CULTIVATION AND CARE.

The cultivation of white pine in plantations throughout the eastern part of the United States is unnecessary. Persistent dead branches should be removed when possible, but it is not advisable to prune live ones. Where there is a demand for small material, the stand may be profitably thinned at the age of 20 to 30 years, removing at this time all suppressed or intermediate trees which are not needed in the stand to shade the ground or to assist in naturally developing the large trees.

Fire must be kept out of stands, since the bark of young trees is

thin and easily damaged, and injuries from this source cause rapid decay.

Information regarding general nursery practice and planting may be obtained from the publications of the Forest Service, which will be forwarded upon request. Insect damage should be reported promptly and specimens mailed to the Bureau of Entomology of the United States Department of Agriculture, where they will be identified and measures suggested for their control.

Approved.

JAMES WILSON,
Secretary.

WASHINGTON, D. C., *November 24, 1906.*

[Cir. 67]

O